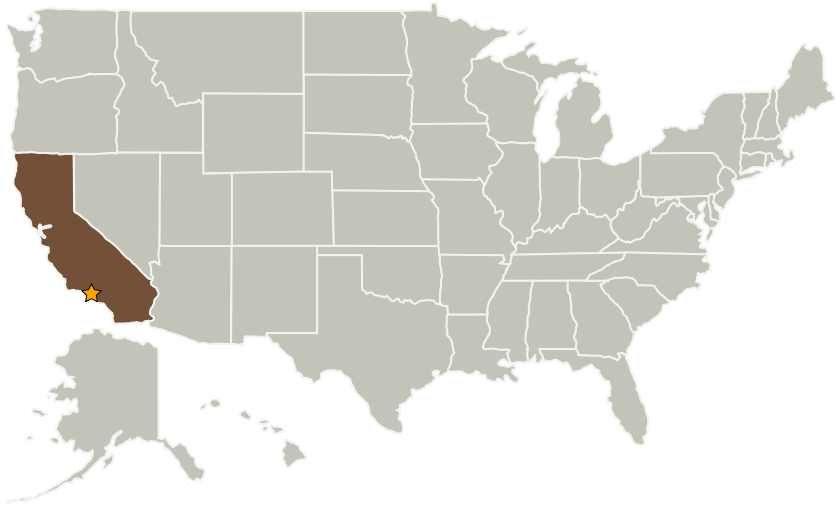
Miniaturized, Low Power Cryogenic Inlet System with Sampling Probes for Titan, Phase II

Completed Technology Project (2006 - 2008)

Project Introduction

Thorleaf Research, Inc. has demonstrated feasibility in Phase 1 and now proposes a Phase 2 effort to develop a miniature, low power cryogenic inlet system with sampling probes for Titan. This addresses a key technology gap for planetary studies, mainly how to acquire and prepare complex cryogenic samples of astrobiology interest for in situ analysis while meeting challenging mass, volume and power constraints. The proposed sampling system is designed to collect surface samples at Titan's 94K (-179C) cryogenic temperatures using two different miniature probe designs, one for collecting atmospheric aerosols, dust or particles, and another for surface penetration. The samples, which are presumed to include hydrocarbons, nitriles, tholins and other materials, can then be thermally processed by vaporization, thermal desorption or pyrolysis to prepare them for chemical analysis by GC/MS, GC/IMS or other techniques. Our Phase 1 results have demonstrated feasibility for developing a miniaturized cryogenic sampling inlet system with sampling probes weighing on the order of 100g with a peak power consumption of 20 watts or less. Because vaporization, thermal desorption or pyrolysis heating would only be required for a few seconds during each chemical analysis duty cycle, we project average power usage at a fraction of a watt.

Primary U.S. Work Locations and Key Partners



Miniaturized, Low Power Cryogenic Inlet System with Sampling Probes for Titan, Phase II

Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Miniaturized, Low Power Cryogenic Inlet System with Sampling Probes for Titan, Phase II

Completed Technology Project (2006 - 2008)

Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
Thorleaf Research, Inc.	Supporting Organization	Industry	Santa Barbara, California

Primary U.S. Work Locations
California

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX04 Robotic Systems
  - TX04.3 Manipulation
    - TX04.3.4 Sample Acquisition and Handling